

**ARTIFICIAL INTELLIGENCE, NEUROPREDICTION, AND CRIMINAL
LIABILITY:
THE EMERGENCE OF ALGORITHMIC CULPABILITY IN
CONTEMPORARY CRIMINAL JUSTICE**

Sergio Pommier Gallo, PhD, JD, LLM

ORCID iD: 0009-0000-7387-3943

Affiliation: Pommier & Miller Attorneys at Law

Abstract

This article examines the emerging role of artificial intelligence, predictive analytics, and neuroscientific forecasting in reshaping contemporary understandings of criminal liability. As criminal justice systems increasingly integrate algorithmic risk assessment, behavioral prediction models, and brain-based forecasting tools, traditional doctrines of mens rea and individualized culpability face unprecedented epistemic challenges. The study argues that predictive systems do not replace normative legal judgment but create a new evidentiary layer that influences attribution of dangerousness, intent inference, sentencing calibration, and preventive detention. A doctrinal framework of algorithmic culpability is proposed to reconcile predictive technologies with due process, evidentiary reliability, and constitutional safeguards.

Keywords: artificial intelligence; criminal liability; algorithmic culpability; predictive justice; neuroprediction; mens rea; due process.

1. Introduction

The expansion of artificial intelligence into criminal justice has transformed how legal systems assess risk, infer dangerousness, and structure preventive responses. Predictive policing systems, sentencing algorithms, behavioral risk scores, and neuroscientific forecasting tools increasingly shape decisions traditionally grounded in human judicial discretion.

This transformation raises a doctrinally significant question: Can criminal liability remain an individualized normative judgment when algorithmic systems increasingly influence assessments of intent, risk, and future dangerousness?

This article argues that artificial intelligence and neuroprediction introduce a new evidentiary architecture that pressures classical models of culpability without displacing the normative autonomy of criminal law.

2. AI-Driven Risk Assessment in Criminal Justice

Modern criminal justice systems now employ machine learning models to estimate recidivism, violence risk, flight probability, and sentencing outcomes. These tools operate through statistical correlations extracted from prior behavioral data, socioeconomic variables, and institutional records.

While these systems may improve consistency and efficiency, they also risk converting probabilistic forecasts into quasi-substantive judgments of blameworthiness.

The legal danger lies in conflating risk prediction with culpability attribution.

3. Neuroprediction and Brain-Based Forecasting

Recent advances in neuroscience and neuroimaging suggest that certain patterns of prefrontal dysfunction, impulse regulation deficits, and neurodevelopmental markers may correlate with violent conduct or recidivism risk.

When integrated into predictive AI architectures, these findings generate a new field of neuroprediction: the use of brain-based variables to forecast future conduct.

This development challenges foundational doctrines of criminal law by shifting attention from past acts toward probabilistic future behaviors.

4. Algorithmic Bias, Fairness, and Due Process

Algorithmic systems may reproduce historical biases embedded in training datasets, including racialized policing patterns, socioeconomic disparities, and unequal prosecution practices.

From a due process perspective, opaque black-box models raise serious concerns regarding:
transparency,

contestability,
expert challenge,
and explainability.

A defendant cannot meaningfully contest evidence that neither counsel nor the court can interpret.

5. The Model of Algorithmic Culpability

This article proposes the concept of Algorithmic Culpability.

Under this model, predictive technologies function as secondary evidentiary modifiers rather than primary determinants of guilt.

Their legitimate use must remain limited to:
risk contextualization,
sentencing proportionality,
supervision intensity,
and post-conviction management.

The final attribution of criminal liability must remain anchored in actus reus, mens rea, and constitutionally valid proof.

6. Constitutional and Evidentiary Limits

The integration of AI and neuroprediction into criminal adjudication must respect:
the presumption of innocence,
the right to confrontation,
explainable evidence standards,
and judicial review.

Predictive probability can inform preventive measures, but it cannot become a substitute for proof beyond a reasonable doubt.

Courts must preserve the distinction between predictive dangerousness and legally attributable culpability.

7. Conclusions

Artificial intelligence and neuroprediction are reshaping criminal justice by introducing new evidentiary tools capable of forecasting risk and behavior.

The legal challenge is not technological adoption itself, but the preservation of doctrinal safeguards against the conversion of prediction into blame.

The proposed framework of algorithmic culpability offers a legally defensible path for integrating predictive systems while preserving due process, mens rea doctrine, and individualized justice.

The future of criminal law will depend on whether legal systems can absorb predictive technologies without surrendering the normative core of culpability.

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